

CHAPTER 10

1

Estimating Quotients

Goal Estimate quotients when dividing decimal numbers.

Heather is wrapping gifts. She has 5.25 m of ribbon.



1. Heather wants to use this ribbon for 2 gifts. Estimate the length she will use for each gift.

Suggested answer: about 2.5 m

2. She wants to use this ribbon for 3 gifts. Estimate the length she will use for each gift.

Suggested answer: about 1.75 m

3. How could you use your answer to Question 1 to estimate the length needed for 4 gifts?

Divide answer to Question 1 by 2.

4. The shortest length of ribbon Heather can use to decorate a gift is about 0.5 m. Does she have enough ribbon to decorate 10 gifts?

Yes.

At-Home Help

A **quotient** is the answer to a division question.

For example, 2 is the quotient of $14 \div 7$.

$$14 \div 7 = 2$$

When you divide a decimal number by a whole number, it is easier to estimate the answer if you round the decimal to the nearest whole number.

For example, to estimate the answer to $8.8 \div 4$, you may round 8.8 to 9.

So $9 \div 4 = 2 \text{ R}1$. Since $\frac{1}{4} = 0.25$, the answer is about 2.25.

Dividing by 10

Goal Use regrouping to divide decimal numbers by 10.

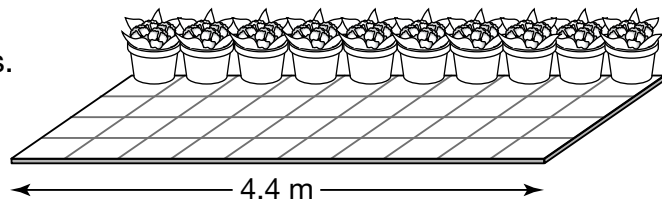
- Craig wants to calculate the length of his running stride. He ran 14.6 m in 10 strides.
 - Use base ten blocks in a place value chart to calculate the length of Craig's stride.

Tens	Ones	Tenths	Hundredths

Craig's stride is 1.46 m long.

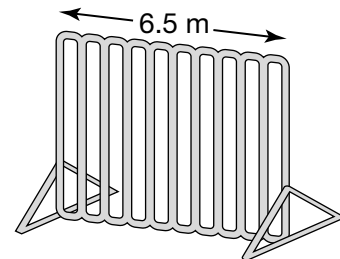
- Use multiplication to check your answer to Part a). $1.46 \text{ m} \times 10 = 14.6 \text{ m}$
- A patio is 4.4 m long. It is divided into 10 equal sections for placing flower pots. How wide is each section?

0.44 m or 44 cm



- A bike rack has sections to park 10 bikes. What is the width of each section if the bike rack is 6.5 m long?

0.65 m or 65 cm



4. Calculate.

a) $23 \div 10$

2.3

b) $16.9 \div 10$

1.69

c) $66.2 \div 10$

6.62

d) $10 \overline{)44.4}$

4.44

e) $10 \overline{)239.7}$

23.97

f) $10 \overline{)263.1}$

26.31

At-Home Help

When you divide any number by 10, the quotient has the same digits as the dividend but each digit moves to the next lower place value.

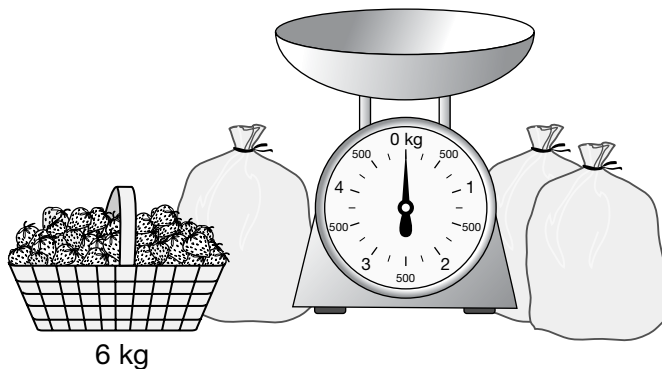
For example, using whole numbers, $350 \div 10 = 35$. The 3 hundreds in 350 become 3 tens, the 5 tens become 5 ones, and the 0 ones become 0 tenths.

Using decimal numbers, $67.8 \div 10 = 6.78$. The 6 tens become 6 ones, the 7 ones become 7 tenths, and the 8 tenths become 8 hundredths.

Calculating a Decimal Quotient

Goal Express quotients as decimal numbers to tenths or hundredths.

1. Graciela has 6 kg of strawberries to divide equally into 8 bags. Calculate the mass of each bag to 2 decimal places. Show your work.



$$\begin{array}{r} 0.75 \text{ kg} \\ 8 \overline{)6.00 \text{ kg}} \\ \underline{5.6} \\ 0.40 \\ \underline{0.40} \\ 0.00 \end{array}$$

2. What will be the mass of each bag if the scale measures mass to tenths of a kilogram?

a) 7 kg divided into 2 bags $\underline{\hspace{2cm} 3.5 \text{ kg} \hspace{2cm}}$

b) 4 kg divided into 8 bags $\underline{\hspace{2cm} 0.5 \text{ kg} \hspace{2cm}}$

3. Calculate to 2 decimal places.

a) $14 \div 8$
1.75

b) $12 \div 5$
2.40

c) $4 \div 5$
0.80

d) $2 \div 8$
0.25

4. Jacob wants to cut a 22 m length of string into 8 equal pieces. Calculate the length of each piece to 2 decimal places.

2.75 m

At-Home Help

When you divide numbers, it is sometimes possible to find a quotient to the nearest tenth or hundredth. This is done by regrouping the remaining ones to tenths and any remaining tenths to hundredths.

For example:

$$\begin{array}{r} 2.75 \\ 4 \overline{)11.00} \\ \underline{8} \\ 3.0 \\ \underline{2.8} \\ 0.20 \\ \underline{0.20} \\ 0.00 \end{array}$$

When 3 ones remain, regroup as 30 tenths.

When 2 tenths remain, regroup as 20 hundredths.

$11 \div 4$ to the nearest hundredth is 2.75.

Dividing Decimals by Whole Numbers

Goal Divide a decimal by a one-digit whole number using models and symbols.

1. Sam's garden is 1.5 m by 6 m.
He divided it into 4 equal sections.

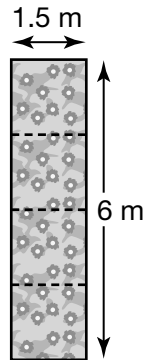
- a) Estimate the area of each section.
Show your work.

Suggested answer: about 3 m^2 .
Round 1.5 m to 2 m.
 $2 \text{ m} \times 6 \text{ m} = 12 \text{ m}^2$
 $12 \text{ m}^2 \div 4 = 3 \text{ m}^2$

- b) Calculate the area to two decimal places. Show your work.

$$1.5 \text{ m} \times 6 \text{ m} = 9 \text{ m}^2$$

$$\begin{array}{r} 2.25 \text{ m}^2 \\ 4 \overline{)9.00 \text{ m}^2} \\ \underline{8} \\ 1.0 \\ \underline{0.8} \\ 0.20 \\ \underline{0.20} \\ 0.00 \end{array}$$



At-Home Help

When you divide a decimal number by a whole number, apply the same rules for division as when you divide two whole numbers. Any whole number remainder is regrouped to tenths and combined with any tenths. Then any remaining tenths are regrouped to hundredths and combined with any hundredths.

For example:

$$\begin{array}{r} 5.63 \\ 4 \overline{)22.52} \\ \underline{20} \\ 2.5 \\ \underline{2.4} \\ 0.12 \\ \underline{0.12} \\ 0.00 \end{array}$$

When 2 ones remain, regroup as 20 tenths and combine with 5 tenths.

When 1 tenth remains, regroup as 10 hundredths and combine with 2 hundredths.

$22.52 \div 4$ to the nearest hundredth is 5.63.

2. Calculate to two decimal places.

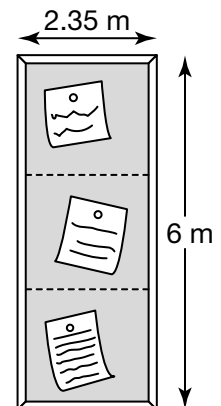
- a) $1.98 \div 2$ b) $7.26 \div 3$
0.99 2.42
- c) $13.64 \div 4$ d) $5.85 \div 5$
3.41 1.17

3. A bulletin board measures 2.35 m by 6 m. It is divided into 3 equal sections. Calculate the area of each section to two decimal places.
 4.70 m^2

4. A hula hoop travels 17.04 m after 6 complete turns.

- a) Estimate the circumference of the hula hoop.
Suggested answer: about 2.75 m
- b) Calculate the circumference of the hoop to the nearest hundredth of a metre. 2.84 m

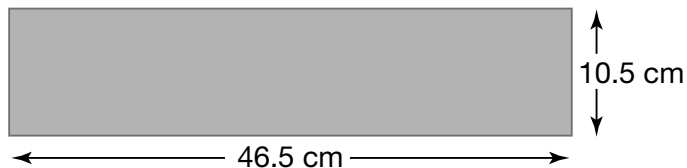
- c) How far will the hula hoop travel after 4 complete turns? 11.36 m



Choosing a Calculation Method

Goal Justify your choice of calculation method.

Ms Shishido is making origami swans from a sheet of coloured paper. The paper measures 10.5 cm by 46.5 cm. She divides the area into 6 equal parts. Each part has a length of 10.5 cm.



At-Home Help

To solve problems, it is important to choose an appropriate calculation method.

- If the numbers are easy to work with, use mental math.
- If the problem asks “About how many ...” use estimation.
- If the problem asks for an accurate answer and you cannot easily calculate the numbers in your head, then use paper and pencil or a calculator.

1. About how wide is each part? about 8 cm

To get my answer I used estimation

because 46.5 cm is close to 48 cm.
2. How wide is each part to the nearest hundredth of a centimetre? 7.75 cm

To get my answer I used calculator or paper and pencil because the question requires an accurate answer and it is not easy to figure out the answer in my head.
3. If the coloured paper were divided into 3 equal parts, how wide would each part be? 15.5 cm

To get my answer I used calculator or paper and pencil because it is not easy to figure out the answer in my head.
4. If 10 swans were made from the coloured paper, what would be the width of each part? 4.65 cm

To get my answer I used mental math because it is easy to divide 46.5 cm by 10.

CHAPTER 10

6

Dividing to Compare

Goal Use division and other operations to solve problems about money.

You will need a calculator.

1. Vasco, his father, and his grandfather, who is a senior citizen, tour the zoo regularly by bus. Vasco is in Grade 5.

	Single-fare ticket	Book of 5 tickets
Adult	\$3.50	\$14.00
Senior and student	\$2.50	\$9.50
Child (12 and under)	\$1.25	\$4.50

- a) What is the cost difference per ticket between a single-fare ticket and a book of tickets? Show your work.

	Cost per ticket using book of 5 tickets	Savings per ticket
Adult	$\$14.00 \div 5 = \2.80	$\$3.50 - \$2.80 = \$0.70$
Senior	$\$9.50 \div 5 = \1.90	$\$2.50 - \$1.90 = \$0.60$
Child	$\$4.50 \div 5 = \0.90	$\$1.25 - \$0.90 = \$0.35$

- b) How much would each person save by using a book of tickets instead of single-fare tickets? Show your work.

$$\begin{aligned} (\text{adult}) 5 \times \$0.70 &= \$3.50, (\text{senior}) 5 \times \$0.60 = \$3.00, \\ (\text{child}) 5 \times \$0.35 &= \$1.75 \end{aligned}$$

2. A package of 3 energy-efficient light bulbs costs \$9.87. A package of 5 bulbs costs \$14.95.

- a) What is the cost difference per light bulb between the two packages? Show your work.

$$\begin{aligned} (\text{cost per bulb in package of 3}) & \$9.87 \div 3 = \$3.29, \\ (\text{cost per bulb in package of 5}) & \$14.95 \div 5 = \$2.99 \\ (\text{difference}) & \$3.29 - \$2.99 = \$0.30 \end{aligned}$$

- b) If 15 high-efficiency bulbs are purchased, what will be the cost difference between buying them in packages of 3 and packages of 5?

$$15 \times \$0.30 = \$4.50$$

At-Home Help

There are two ways to compare costs if you know the cost of a package of items and the cost of an individual item.

- Find the cost per item in the package by dividing the cost by the number of items.
- Multiply the cost of an individual item by the number of items in the package.

For example:

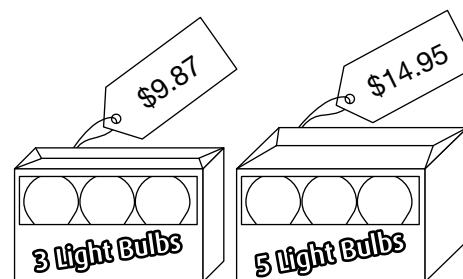
The cost of a package of 5 tennis balls is \$3.95 and the cost of one tennis ball is \$1.19.

$$\begin{aligned} \text{cost of one tennis ball in package} & \\ &= \$3.95 \div 5 \\ &= \$0.79 \\ \text{difference} &= \$1.19 - \$0.79 \\ &= \$0.40 \text{ per tennis ball} \end{aligned}$$

OR

$$\begin{aligned} \text{cost of 5 tennis balls} & \\ &= 5 \times \$1.19 \\ &= \$5.95 \\ \text{difference} &= \$5.95 - \$3.95 \\ &= \$2.00 \text{ per 5 tennis balls} \end{aligned}$$

It is more expensive to buy the tennis balls individually.



Calculating the Mean

Goal Use division to calculate the mean.

1. Karen and Fariq play basketball on different teams. Their team scores for last month are shown below.

Karen's team scores	Fariq's team scores
26	37
33	13
17	22
24	

Calculate the mean score for each team.

(Karen) 25, (Fariq) 24

2. Calculate the mean of each set of numbers.

a) 5, 8, 8, 9, 10

8

b) 2, 3, 4, 5, 6

4

c) 120, 130, 342, 376

242

d) 12.4, 11.2, 9.1, 7.7

10.1

3. a) Create a set of 5 different numbers where the mean is one of the original numbers.

Suggested answer: 10, 11, 13, 15, 16

(mean) 13

- b) Create a set of 3 different numbers where the mean is not one of the original numbers.

Suggested answer: 150, 200, 226

(mean) 192

At-Home Help

The **mean** of a set of numbers is equal to the sum of all the numbers divided by the number of numbers in the set.

For example:

7, 8, 9, 11, 11, 14

$$\text{sum} = 7 + 8 + 9 + 11 + 11 + 14$$

$$= 60$$

$$\text{mean} = 60 \div 6$$

$$= 10$$

CHAPTER 10

8

Solve Problems by Working Backward

Goal Use a working backward strategy to solve problems.

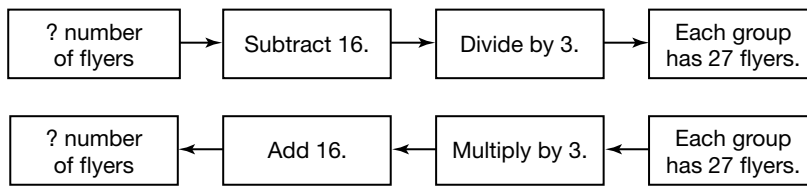
- Keisha delivers advertising flyers. He delivered 16 flyers in his own apartment building. Then he divided the remainder into 3 groups of 27 to deliver in nearby buildings.



- How many flyers did Keisha have originally?

97 flyers

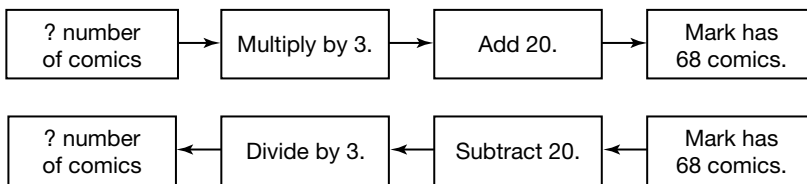
- Draw a diagram as in At-Home Help to show how you solved the problem by working backward.



- Frank collects comic books. He tripled his collection last month. Then his friend gave him 20 more comics. Now he has 68 comics.

How many comics did Frank have one month ago?
Use a working backward strategy. Show your work.

16 comics



- A number is multiplied by 8. Then 6.4 is added to the product. The result is 80. What is the original number? 9.2
- Tickets for a concert were sold during the week. A quarter were sold on Monday. 30 were sold on Tuesday. On Wednesday 39 were left. How many tickets were there originally? 92 tickets

At-Home Help

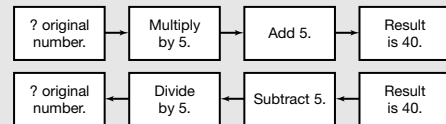
To solve some problems, it is easier to find the answer by working backward.

Start by drawing a diagram to help figure out each operation you need to use.

Remember that multiplication is the opposite operation to division, and subtraction is the opposite operation to addition.

For example:

A number is multiplied by 5. Then 5 is added to it and the result is 40. What is the original number?



The original number is 7.



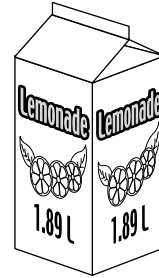
CHAPTER 10

Test Yourself

Circle the correct answer.

1. A 1.89 L carton of lemonade is shared equally by 6 people.
What is the best estimate of each person's share?

A. 0.3 L **B. 0.4 L**
C. 0.5 L **D. 0.6 L**

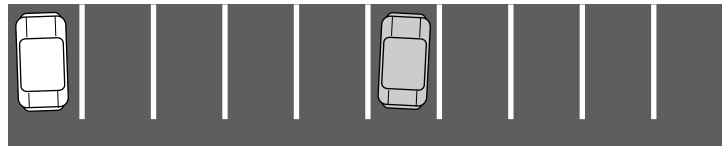


2. Jason's mother drove to work and back, and nowhere else, each day for 5 days. The odometer showed she had driven 95.3 km.
What is the distance from her home to her workplace?

A. 953 m **B. 95.30 km** **C. 9.53 km** **D. 0.953 km**

3. A 45.7 m wide parking lot is divided into 10 parking spaces. What is the width of one parking space?

A. 457 m **B. 45.70 m**
C. 4.57 m **D. 0.457 m**



4. A 1.2 kg package of trail mix is shared equally by 8 people. What is the mass of each person's share?

A. 120 g **B. 0.15 kg** **C. 1.5 kg** **D. 1.2 kg**

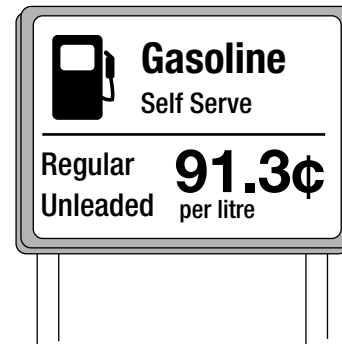
5. An open office space measures 24 m by 3.5 m. It is divided into 8 equal-sized cubicles. What is the area of each cubicle?

A. 84 m² **B. 84 cm²** **C. 105 m²** **D. 10.5 m²**

6. What methods would you use to do these calculations?

- (i) What is the cost of 10 L of gas?
(ii) About how much would 25 L of gas cost?
(iii) How much change would Mr. Kwan receive if he paid \$40.00 for 25 L of gas?

A. (i) mental math, (ii) a calculator, (iii) estimation
B. (i) mental math, (ii) estimation, (iii) a calculator
C. (i) estimation, (ii) mental math, (iii) a calculator
D. (i) a calculator, (ii) estimation, (iii) mental math



Test Yourself Page 2

7. A package of 6 containers of yogurt costs \$2.94. Individually these containers cost \$0.65. What is the cost difference between purchasing the package and purchasing 6 individually?

A. \$0.96 **B. \$0.16** **C. \$1.96** **D. \$0.80**

8. High temperatures for a five-day period were recorded.

Temperature (°C)	17.3°C	18.7°C	14.4°C	19.2°C	11.9°C
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What is the mean high temperature for this period?

A. 14.4°C **B. 16.3°C** **C. 16°C** **D. 17.3°C**

9. How would you label these statements?

- (i) The mean of a set of numbers must be one of the original numbers.
 (ii) The mean of a set of numbers can be one of the original numbers.
 (iii) The mean of a set of numbers must lie within the range of the numbers in the set.

A. (i) true, (ii) false, (iii) true **B. (i) false, (ii) true, (iii) false**
C. (i) true, (ii) false, (iii) false **D. (i) false, (ii) true, (iii) true**

10. A scout group is divided into 6 equal squads. At the last meeting, Squad A had 2 members absent and 7 members present. How many members are in the group altogether?

A. 42 **B. 30** **C. 50** **D. 54**

11. A case of 4 1 L cartons of juice costs \$8.96. Individual cartons cost \$2.49. What is the cost difference per carton between a case and 4 individual cartons?

A. \$0.25 **B. \$0.30**
C. \$0.20 **D. \$0.26**

